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BOTANY.

Smith's Bacteria in Relation to Plant Diseases.¹—Bacteriologists have long awaited Dr. Smith's work on the bacterial diseases of plants. We are now favored with the first part dealing with the methods of work and general literature of the subject. The monograph is not intended to take the place of the many text-books on the subject, but rather to supplement them. The work will be found useful to animal pathologists, as well as to plant pathologists. The monograph is the outgrowth of the work which has been carried on in the study of bacterial diseases of plants in the Laboratory of Plant Pathology, United States Department of Agriculture. The methods described have all been tested and are now in use in the Department. The following suggestions in regard to "A Study of an Organism" should be impressed on every beginner.

"Every one who has carefully inquired into the matter knows that the brief statement of the behaviour of an organism on nutrient agar, on gelatin, and on two or three other media, with perhaps a loose statement of its color and size, no longer constitutes a description which describes. Such accounts, of which there are a great many, usually fail to mention just those things which might serve to distinguish the organism from its fellows. If a new species is not to be described so that it can be identified by others, what then is the use of any name or description? The name will only serve to encumber future synonymy and to recall the incapacity of its author." The following topics indicate the broad and comprehensive scope of the subject matter: The Disease, The Organism, Physiology, Relation to Free Oxygen, Luminosity, Bibliography, General Literature, and Formulæ.

The author states that great stress should be laid on the minute morphology in a variety of cultures. He recommends especially the use of photography in microscopic work, which Dr. Koch has said "would certainly have prevented a great number of unripe pub-

¹ Smith, Erwin F. *Bacteria in Relation to Plant Diseases*—Volume 1, *Methods of Work and General Literature of Bacteriology exclusive of Plant Diseases*. Publication No. 27 Carnegie Institution of Washington, 285 pp., 31 pls., 146 text figs.

lications." Not only is it necessary to determine motility, but the organs of motility should be stained. The part of the work dealing with culture media is an excellent treatise; every working bacteriologist can get many valuable suggestions from it. The many conflicting statements as to the behavior of organisms by different authors arise largely from the character of the media used. In regard to vegetable media, he prefers to have them sterilized in the steamer rather than the autoclave. If boiling changes the nature of any fluids it is advisable to use the Chamberland or Berkefeld filter, but Chamberland bougies should not be used continuously for more than three days, because of the growth of small organisms in the walls of the filter, when they should be sterilized. There is a highly interesting discussion of sensitiveness to plant acids. The *Bacillus tracheiphilus* is used to show tolerance for sodium hydrate. Its tolerance for this substance can be considerably increased by inoculating each time from alkaline bouillons rather than from acid ones. The thermal relations of bacteria are among the most interesting and should be studied with great care. Under the head of economic aspects of the subject he argues with force that more attention should be given to the collection of accurate statistics by competent persons as an aid to legislature and governments. There are some excellent suggestions on natural methods of infection, how the parasites are introduced from one field to another by the roots of plants and in plants. The soil is a living thing and should not be transported from one field to another carelessly; the parasite may gain an entrance through wounds, by way of the stomata, lenticels, water pores, and nectaries. The keeping of records is an important part of the work of the experimenter, and it would be well for every bacteriologist to have Dr. Smith's work at hand and follow carefully the outlines given. The beginner should also be interested in the card-catalogue system used by the author.

The systematist will be interested in his discussion of nomenclature and classification, a subject naturally in a very chaotic state because systematic botanists have given so little attention to it, and medical men have cared even less about the classification of bacteria. He does not think it advisable to use *Bacillus* 1, 2, or 3 or A. B. C.; if the organism is really new and distinct, it should be given a name. Every working botanist will agree with him that all polynomials like *Bacillus coli-communis* are to be regarded as "*nomina excludenda*." We agree also that all species antedating the Koch poured-plate method, which are not accurately described, should be abandoned.

"The *Micrococcus pellucidus*, although published quite recently and in the *Comptes Rendus* of the French Academy, is not described any better." "I find it quite impossible," says Mr. Stoddert, "to identify many species from published descriptions." Numerous complaints of this sort, made in recent years by well trained and competent men, sufficiently indicate the necessity of a thoroughgoing reform. He makes a plea for better and more careful descriptions, and concerning the use of the uncertain old names says: "And here I wish to register a protest against anything of this nature ever being done. If, in his own generation, a name cannot be associated beyond doubt with a particular organism by means of an author's description or figures or collected specimens, then this name should disappear, never to be revived. Societies of bacteriologists should unite in the near future on some authoritative date for the beginning of species priority, so that some sort of stability may be guaranteed to the nomenclature of the future."

In this part of the work there is a good discussion of the more modern systems of classification, that of Dr. Alfred Fischer, 1895, and the Migula classification, the latter of which is largely followed in this country. He then gives descriptions of the following orders and families: order Eubacteria, family Coccaceæ (Zopf emend.), Mig., family Bacteriaceæ, family Chlamydobacteriaceæ; order Thio-bacteria, family Beggiatoaceæ, family Rhodobacteriaceæ, subfamily Thiocapsaceæ, subfamily Lamprocystaceæ, subfamily Thiopediaceæ, subfamily Amœbobacteriaceæ, subfamily Chromatiaceæ, to which he has very properly added the Myxobacteriaceæ. Some changes are proposed in nomenclature of genera and species. The genus *Bacterium* (Cohn) takes the place of *Pseudomonas* of Migula. The *Pseudomonas campestris* becomes *Bacterium campestris*. The *Bacillus anthracis* of Cohn is the type of a new genus, *Aphlanobacter*. The organism then should be called *Aphlanobacter anthracis* (Cohn) E. F. Smith. The genus *Vibrio* (Muller, Cohn) includes the *Spirillum cholera-asiaticæ*. Otherwise he follows the classification of Migula. There are good grounds for the changes here proposed.

The author has brought together formulæ for stains, synthetic and nonsynthetic culture media, tests for indol, and fixing fluids. Sixty-three pages are devoted to bibliography, well arranged and frequently provided with abstracts of the papers. Many excellent plates accompany the paper. The frontispiece contains halftones of five eminent bacteriologists: Ferdinand Cohn, Robert Koch, Louis Pasteur, Emile Roux, and Emile Duclaux.

This volume is the most important piece of general bacteriological literature that has been published in this country. It would be well indeed to have a copy of it in every working laboratory.

L. H. PANNUEL

A Bibliographical Index of North American Fungi.¹— For about thirty years Professor Farlow has been accumulating a card index referring to the fungi of North America. Nearly twenty years since, two authors' lists of works on this subject were published, and have been kept at the elbow of every student of our fungi since their appearance. The publication has now been commenced of the references to genera and species, as Publication No. 8 of the Carnegie Institution.

The preparation of an index may appear to the uninitiated a simple matter. A perusal of the author's seven-page preface is calculated to undeceive one who holds such an opinion, and the preface also contains some of the most sensible of recent commentary on nomenclature in natural history. A full list of abbreviations, and their consistent use, have rendered possible a wonderfully condensed presentation of the references to publications, which are kept within the limits of a single text line each. Synonyms are intelligibly collocated with accepted names, and free use is made of cross references.

In the preparation of the index, the author has had the assistance of Mr. Seymour's keen eyes for many years, and it may be predicted with safety that no important omissions will be found. Dr. Farlow's own familiarity with the literature of his subject is second to that of no one, and the knowledge of fungi that he has brought to the acceptance of admitted names, the placing of those treated as synonyms, and a very free critical annotation, is unequalled.

The Carnegie Institution is to be congratulated on having undertaken the publication of so generally useful a work as the *Index of North American Fungi*, the value of which in facilitating thoroughness of study is certain to make itself felt in all future publications on this important subject.

W. T.

Osterhout's Experiments with Plants.²— This book brings before

¹Farlow, W. G. *Bibliographical Index of North American Fungi*. Vol. 1, part 1, "Abrothallus" to "Badhamia." The Carnegie Institution, Washington, Sept. 1, 1905. 8vo, xxxv + 312 pp.

²Osterhout, W. J. V. *Experiments with Plants*. New York, The Macmillan Company, 1905. 8vo, x + 492 pp., 252 figs.